ejpmr, 2024, 11(6), 303-312

SJIF Impact Factor 7.065

EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.ejpmr.com

Research Article

ISSN 2394-3211

EJPMR

FORMULATION AND *IN VITRO* EVALUATION OF POLYHERBAL ANTIACNE FACEWASH GEL

Ayesha Siddiqua Gazi, Adeeba Kausar*, Syed Salman and Abdul Sami Asghar

Department of Pharmaceutics, Deccan School of Pharmacy, Hyderabad, India, 500001.

***Corresponding Author: Adeeba Kausar**

Department of Pharmaceutics, Deccan School of Pharmacy, Hyderabad, India, 500001.

Article Received on 06/04/2024 **Article Revised on 27/05/2024** **Article Accepted on 17/05/2024**

ABSTRACT

Many plants derived components are used in cosmetic products have been reported to treat skin diseases such as acne. The main aim of this research was to formulate and evaluate the antiacne herbal facewash formulation containing the extract of cucumber, neem, turmeric, aloe vera, which has been previously reported to have antiacne, anti-inflammatory, antibacterial and antioxidant properties. Thus, the aqueous extract of cucumber was extracted with glycerine and the ethanol extract of neem, turmeric and aloe vera was extracted with ethanol and four base formulation were prepared using xantham gum, glycerine, coco betaine, almond oil, rose oil and sodium benzoate. The resulting formulation exhibit a smell of sweetly floral and colour as green. **Result:** The pH of the herbal formulations were determined and ranged from 6.0-7.0 and F3 formulation exhibit more stability when compare to F1 and F2 formulation. **Conclusion:** The formulation features the ideal physical and stability characteristics of facewash and possesses antiacne, anti-inflammatory, antiageing and antimicrobial properties.

KEYWORDS: Polyherbal facewash, acne, antibacterial activity, skin health, natural plants, coco betaine.

ACNE

INTRODUCTION

Acne vulgaris is an easily recognizable dermatologic disease. Acne is seen in nearly 100% of individuals at some time during their lives. Acne affects primarily the face, neck, upper trunk and upper arms. On the face it occurs most frequently on the cheeks and to a lesser degree on the nose, forehead and chin. It is characterized by seborrhea, the formation of comedones, erythematous.

Figure No.1. ACNE

ACNE papules, and pustules, less frequently by nodules, deep pustules, or pseudocycts and in some case, is accompanied by scarring.

Epidemiological data suggests that acne incidence rates are considerably lower in non-westernized societies. Acne can have a significant physical, emotional and social impact on an individual. The treatment for acne dates back to Egyptian times when sulfur was used, to recent times with new forms of treatment with lasers and lights. Many different treatment options are available for the treatment of acne vulgaris. Commonly used topical treatments include benzoyl peroxide, antibiotics, sulfur and sodium sulfacetamide, azelaic acid and retinoids. Systemic treatment is frequently used and includes the use of systemic antibiotics, oral contraceptives, antiandrogens and retinoids. Other treatment modalities exist such as the use of superficial chemical peels as well as using laser and light devices for the treatment of acne. Possibly the most interesting treatment on the perspective is vaccine therapy for acne.

TYPES OF ACNE

Whiteheads and blackheads, both also referred to as comedones, are the most common acne lesions.

Blackheads, or open comedones, open at the surface of your skin. Oxygen in the air (not dirt) gives the top of these pimples their darker appearance.

Whiteheads, or closed comedones, form as raised bumps under the surface of your skin. They remain flesh-colored.
Inflammatory lesions, which are more likely to cause scarring of your skin, include:
Papules: These small, red, raised bumps are caused by inflamed or infected hair follicles.
Pustules: These small red pimples have pus at their tips.
Nodules: These solid, often painful lumps develop beneath the surface of your skin.

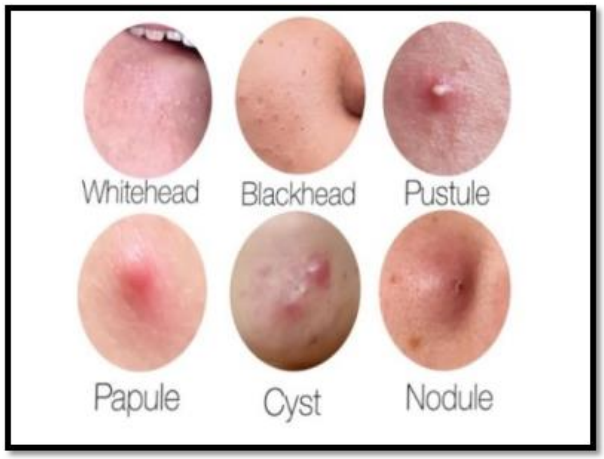

Figure No.2 Types Of Acne.

Cysts: These large lumps beneath your skin contain pus and are usually painful.

PART OF SKIN WHICH IS AFFECTED AND CAUSE ACNE
Acne is caused when tiny holes in the skin known as hair follicles blocked. As sebaceous glands. become overactive, it produces excess oil.

Follicles become plugged, resulting in blackheads and whiteheads. These plugged follicles can then become inflamed, causing pimples, nodules and cysts.

Propionibacterium acnes (P. acnes) are identified as a major causative agent for acne Vulgaris.

PREVENTION
- The first step is to wash regularly your face with favewash.
- Choose The right skin care.
- Keep your hands off.
- Stay out of the sun & tanning beds.
- Visit your Dermatologist.
- Avoid picking, squeezing & popping
- Practice skin care.
- Don't pick or pop your pimples
- Stay hydrated
- Develop a consistent skincare routine
- Avoid steroid cream application for acne.

Figure No.3: Tips to reduce acne.

FACE WASH
Definition: A face wash is a type of facial cleanser that is specifically designed to remove makeup, dirt, oil, dead skin cells, and other impurities from the skin of the face. This helps to unclog pores and prevent skin conditions such as acne, leaving the skin feeling clean and refreshed. A face wash is typically used as part of a daily skircare routine, along with a toner and moisturizer.

Figure No. 4: Facewash.

ADVANTAGES OF FACE WASH: There are several benefits of using a face wash as part of your skincare routine, including:-

1. Removal of dead skin cells: Regular use of a face wash helps to remove dead skin cells from the surface of the skin, which allows new skin cells to replace them. This promotes healthy skin cell turnover and helps to keep the skin looking radiant.
2. Fresh and healthy skin: A face wash helps to remove dirt, oil, and other impurities from the skin, which can leave it looking cull and tired. Regular use of a face wash can help to keep the skin looking fresh and healthy.
3. Prevention of acne: Excess oil and dirt can clog pores and lead to acne breakouts. Using a face wash can help to urclog pores and prevent the formation of acne whiteheads, blackheads, and other skin problems.
4. Slower development of wrinkles: By removing dead skin cells and promoting healthy skin cell turnover, a face wash can help to slow down the development of wrinkles.
5. Improved blood circulation: The exfoliating action of a face wash can help to improve blood circulation in the skin, which can promote skin regeneration and rejuvenation.

PROPERTIES OF FACE WASH: When choosing a face wash, it is important to look for one with the following properties:-

1. A good face wash should be stable and have a pleasant appearance.
2. The face wash should soften on application to the skin, making it easy to spread.
3. The face wash should spread easily on the skin without dragging or feeling oily or grensy.
1. 4 After the water has evaporated, the residue of the face wash should not become viscous.
4. The physical action of the face wash should be that of flushing the skin and opening pores, rather than absorbing into the skin.
5. A thin emollient film should remain on the skin after use, providing a protective barrier and keeping the skin hydrated.

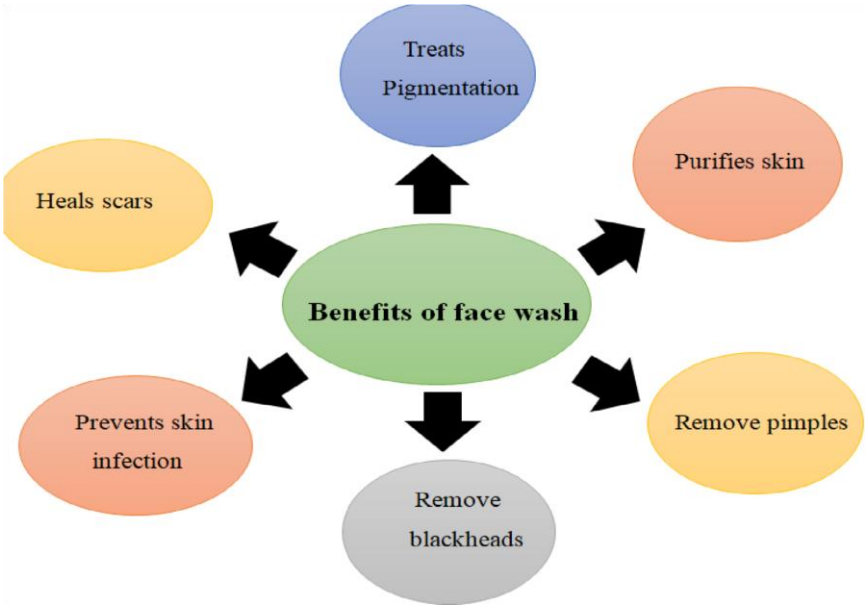

Figure No.5: Benefits of Facewash.

FORMS OF FACE WASH

Cream based face wash
Gel based face wash
Liquid based face wash
Face wash in powder form

1) Cream based facewash:- A cream-based facewashes as well as moisturizes your skin. A cream-based facewash is usually thick, creamy, and contains essential moisturizing elementslike botanical oils. It will help you in getting rid of any dirt, sweat, makeup, or bacteria. Cream based facewashes is benefical to dry skin.

2) Gel based facewash:- Gel facewash is a water-based facewash with a gel-like texture that are typically made from the extracts of flowers and essential oils. Gel facewash that can help balance your skin's PH. Gel facewash is recommended for sensitive and irritative or itchy skin types. Although many gel facewash remove extra oil.

3) Liquid based facewash

Liquid-based face washes are common skincare products that come in liquid form, typically in bottles or tubes. Liquid face washes are usually water-based and may contain various ingredients like surfactants, moisturizers, exfoliants, and botanical extracts. They are easy to use and wash out.

Figure No. 6: Types of Facewash.

MATERIAL AND METHODS

CUCUMBER

Biological Source: It is derived from the plant Cucumis sativus. It is winery cultivated plant in the gourd family cucurbitaceae.

Chemical Constituents: Cucurbitacins, Alkaloids, volatile oils, saponins, flavonoids, mucilage, proteins, fixed oils, vitamins A, B, C. minerals.

Figure No.7 Cucumber.

Uses of Cucumber

Hydration, Skin Brightening, Soothing, Calming, Toning, Brightening, Anti-inflammatory Puffiness Reduction and Oil Control.

NEEM

Biological source: Neem consists of the fresh or dried leaves and seed oil of Azadirachta indica J. Juss (Melia Indica or M. azadirachta Linn.) belonging to family Meliaceae.

Active constituents: The most important active constituent is azadirachtin and the others are nimbolinin, nimbin, nimbidin, nimbidol, sodium nimbinate, gedunin, salannin, and quercetin.

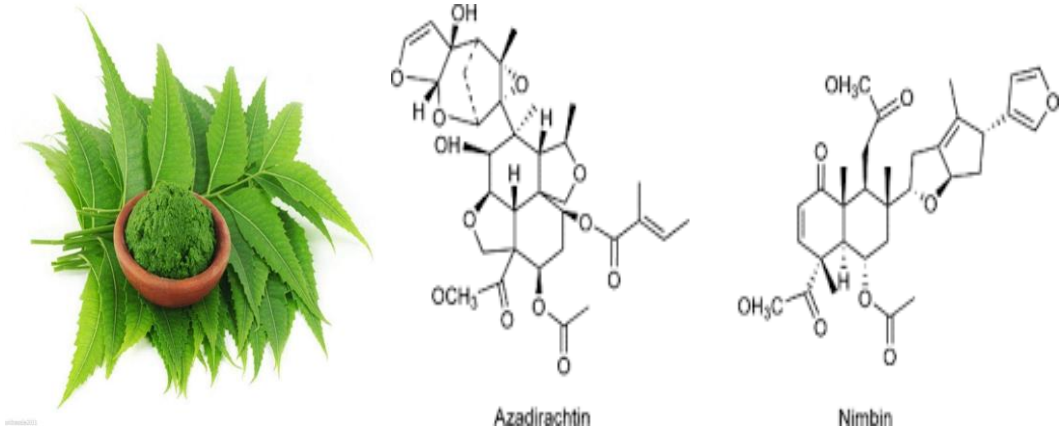

Figure no. 8: Neem.

Uses of Neem

Acne Treatment, Antioxidant Protection, Anti-Bacterial, Anti-inflammatory, Skin Rejuvenation, Controls Excess Oil and Natural Cleanser.

ALOE VERA

Biological Source: Dried juice collected by incision from the bases of the leaves of various species of Aloe. Aloe bardadensis (Curacao aloes), Aloe spicata(Cape aloes), Aloe perryi(Socotrine aloes) and Aloe ferox Miller. Family: Lilaceae.

Figure No. 9: Aloe Vera.

Chemical Constituents

The most important constituents of Aloes are the three isomers of Aloins, Barbaloin, β-barboloin and Isobarbaloin, which constitute the so-called 'crystalline' Aloin, present in the drug at from 10 to 30%. Other constituents are amor-phous Aloin, resin, emodin and Aloe-emodin.

Uses of Aloe Vera

Hydration, Antiacne, Sun Burn Relief, Skin Barrier Repair, Moisturizing.

TURMERIC

Biological source: Curcumin or Curcuminoids are the diaryl hepnoid compounds obtained from the dried rhizomes of Turmeric, Curcuma longa, belongs to family-Zingiberaceae.

Chemical Constituents: Curcumin is the major colouring principle component present upto 5% in the rhizomes. Mixture of curcumin monodesmethoxycurcumin, bisdesmethoxy Curcumin.

Figure No. 10: Turmeric.

Uses of Turmeric

Anti inflammatory effect, Anti aging, Antioxidant protection, Skin Healing, Antibacterial.

COCOBETAINE

Cocamidopropyl betaine (CAPB) is a mixture of closely related organic compounds derived from coconut oil and dimethylaminopropylamine. CAPB is available as a viscous pale yellow solution and it is used as a surfactant in personal care products.

Figure No.11: Coco Betaine.

Uses Of Cocobetaine

Natural Foaming agent
Moisturizer
Emulsifier

INGREDIENTS	SCIENTIFIC NAME	CHEMICAL CONSTITUENTS	ACTIVITY
CUCUMBER	Cucumis Sativus	Cucurbitacins	Anti inflammatory,
NEEM	Azadirachta indica	Nimbin, Nimdin, Azadirachtin,	Antimicrobial, Anti inflammatory Antiacne, Antiseptic
TURMERIC	Curcuma Longa	Curcuminoids, Curcumin	Anti inflammatory effect antioxidant protection
ALOE VERA	Aloe barbadensis Miller	Aloin,Barbolin BetaBarbaloin	Anti Acne, Soothing and calming, Antioxidant, Gentle Exfoliation
XANTHUM GUM			Gelling Agent
COCO BETAINE			Foaming Agent
GLYCERINE			Humectant
ALMOND OIL			Antioxidant
ROSE OIL			Fragrance
SODIUM BENZOATE			Preservative
WATER			Vehicle

Figure No.12: List of Ingredients.

EXTRACTION

Extraction is the separation of medicinally active portions of plant using selective solvents through standard procedures. The purpose of all extraction is to separate the soluble plant metabolites, leaving behind the insoluble cellular marc.

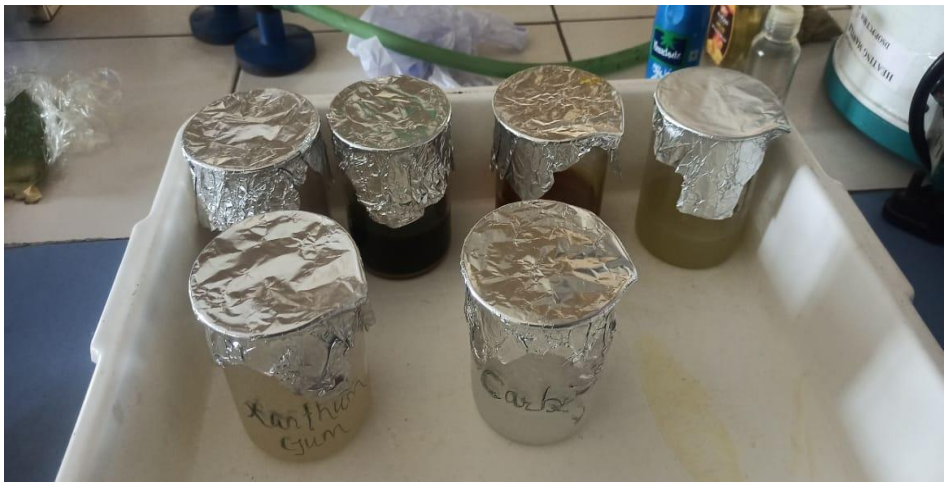

Figure No. 13: Extraction.

PREPARATION OF ALOE VERA GEL EXTRACT

Mature, healthy and fresh aloe vera leaves were washed first under running tap water, followed by distilled water and air-dried for 3 d. Then the outer part of the leaf was dissected longitudinally using a sterile knife and gel that is the colorless, parenchymatous tissue was removed. 15g of inner juice of aloe vera leaves was heated at a constant temperature of 80 °C for 1 hour using both aqueous and ethanolic extracts, ratio of 0.1:3 solvent using magnetic stirrer. Then the mixture is filtered using whatman filter paper no.1. The filtered product which is a clear aloe vera gel.

Figure No. 14: Aloe Vera Gel Extract.

PREPARATION OF CUCUMBER EXTRACT

Wash and cut into pieces transfer into a beaker. Then blend and sieve it.

Transfer into a beaker add 5ml of glycerin and add 0.5g of citric acid as preservative.

Figure No. 14: Cucumber Extract.

PREPARATION OF TURMERIC, NEEM EXTRACTS

The fresh leaves of Neem, and rhizomes of Turmeric were washed first under running tap water, followed by distilled water and air-dried at room temperature in the dark then grinded to powder using an electric blender. The powdered crude drugs of 5 gm were taken into the conical flask and 100 ml of ethanol was added to it, then the conical flask was capped with aluminium foil. Then this mixture was placed for maceration for 5 days.After maceration it is filtered using Whatman filter paper no.1.Finally, the extract is collected and closed the mouth with aluminium foil which is further used to carry out the research work.

Figure No. 15: Neem and Turmeric Extract.

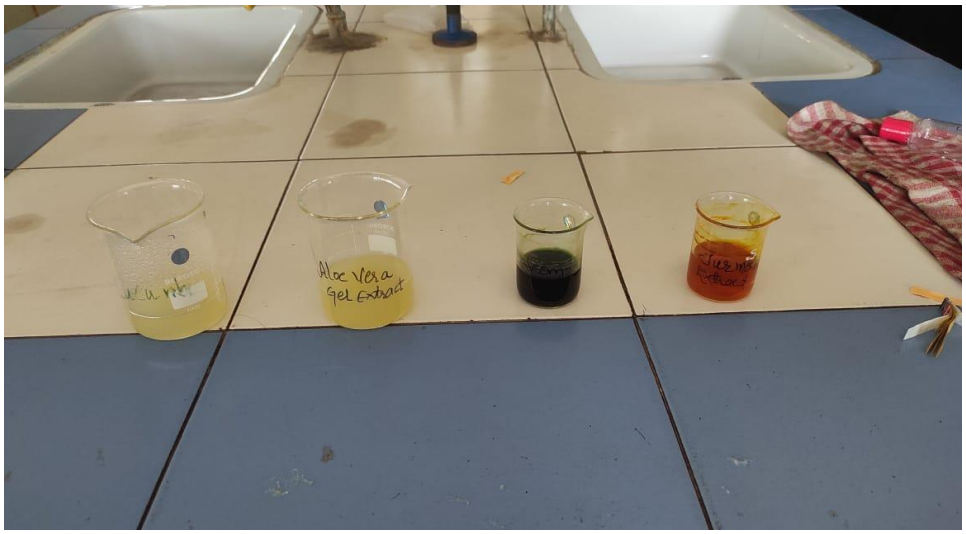

Figure No. 16: All Four Herbal Extract.

FORMULATION

Table 1: Composition of formulations.

S. No	Ingredients	F1	F2	F3
1	Aqueous extract of cucumber	5ml	5ml	5ml
2	Ethanolic extract of Neem	3ml	3ml	3ml
3	Ethanolic extract of Turmeric	2ml	1.5ml	1ml
4	Aloe vera	1ml	1.5ml	2ml
5	Xanthum Gum	1.5g	2g	2.5g
6	Glycerine	5ml	5ml	5ml
7	Coco Betaine	2ml	2ml	2ml
8	Almond oil	1ml	1ml	1ml
9	Rose oil	q.s	q.s	q.s
10	Sodium Benzoate	0.2g	0.2g	0.2g
11	Distilled Water	q.s	q.s	q.s

PREPARATION

Take 5ml of Cucumber extract in a beaker then this beaker add neem,turmeric and aloevera extract.

Then in a china dish take xantham gum and dissolve it in a glycerin.

Then add above china dish mixture to the beaker.

Then all are mix 2 to 3 min. Add almond oil, rose oil sodium benzoate and coco betaine. Then makeup the volume with water. Final facewash is ready and it packing in the bottle.

Figure No. 18 Prepared Facewash.

EVALUATION PARAMETERS

PHYSICAL EVALUATION

Physical parameters such as colour, presentation and quality have been visually tested.

WASHABILITY

The product was applied on hand and was observed under running water.

MEASUREMENT OF PH

pH of 1% aqueous solution of the formulation was measured by using litmus paaper.

EXTRUDABILITY

The gel formulation was filled with standard capped collapsible aluminium tubes and sealed to the end. The weight of tubes was recorded and the tubes were placed between two glass slides and were clamped. 500gmweight was placed over the slides and then the cap was removed. The sum of extruded has been collected and measured. The percent of the extruded gel was measured as

When it is greater than 90% then extrudability is excellent.
When it is greater than 80% then extrudability is good.
When it is 70% then extrudability is fair

SPREADABILITY

Spreadability denotes the degree to which the gel spreads easily to the skin or the affected portion when applied. The seconds taken by two slides to slip off the gel, put between the slides, under a certain load. Less time taken to separate the two slides, better spreadability. The formulation of the herbal size. The spreadability is expressed in terms of time in occupied by a distance of 6 cm along the slide. The weight of 100gm was placed on the upper slide, so that the gel between the two slides was pressed evenly to a thin layer. The weight was removed and the excess of the gel adhering to the slides was scrapped off. The two slides in position were fixed to stand without slightest disturbance and in such a way that only the upper slide to slip off freely by the force of weight tied to it. The weight of 20gm was carefully attached to the upper slide. The time taken for the upper slide to travel the distance of 6cm and separated away from the lower slide under the influence of the weight was noted. The experiment was repeated three times on both formulated gels. Spreadability was calculated by using the following formula,

$$S=M\times L/T$$

Where,
S- Spreadability
M- Weight tied to the upper slide (20gm)
L- Length of the glass (6.5cm)
T- Time in sec

IRRITANCY TEST

The gel was applied on left hand dorsal side surface of 1sq.cm and observed in equal intervals upto 24hrs for irritancy, redness and edema.

FOAM ABILITY

A small amount of gel has been taken in a beaker containing water. Initial volume was noted, beaker was shaken for 10 times and the final volume was noted.

GRITTINESS

The formulations were checked for the presence of any gritty particles by applying it on the skin.

VISCOSITY

The viscosity of face wash gel was determined by using digital Brookfield viscometer. 50ml of herbal face wash is taken into 100ml of beaker and the tip of viscometer was dipped into the beaker containing face wash formulation and its viscosity was measured.

Figure No. 18: Comparison of Prepared Facewash Gel with Marketed Formulation.

STABILITY STUDIES

Stability studies were carried out for the optimized formulation F3 according to International Conference on Harmonization (ICH) guidelines. Short term accelerated stability studies were carried out for the period of 3 months for the formulation [F3]. The samples was stored at different temperature conditions i.e., refrigeration temperature (4-8˚C), room temperature (25±2˚C) and oven maintained at (45˚C±2˚C). Samples was withdrawn on weekly time interval and analyzed for visual appearance, viscosity, extrudability, spreadability, foam ability, grittiness and pH. Sample was withdrawn at 1,3,6,9 and 12 weeks and evaluated for various parameters.

RESULTS AND DISCUSSION

In the present study, prepared multi herbal face wash gel has shown various pharmacological uses for skin such as antiacne, anti-inflammatory, antibacterial, anti-microbial, antioxidant,anti-ageing effects and also gives glow to the skin. In this study, totally four formulations were prepared and evaluated. The colour of the prepared gel was found to be green and the intensity of the colour was increased with the increase in the concentration of extract in the gel. The viscosity, extrudability, spreadability, stability studies and pH of the formulations showed that there is a significant change. The stability studies were carried out at different temperature conditions i.e., refrigeration temperature (48˚C), room temperature (25±2˚C) and oven maintained at (45˚C±2˚C). All the four formulations were easily washable and also have semisolid consistency. There are no side effects and skin irritation. Compared to all formulations F3 is the best formulation having pH-7.

Table 2: Physicochemical studies of developed formulations.

S. No	Physicochemical parameters	F1	F2	F3
1	Viscosity (cps)	3316.48	3091.56	2482.57
2	Extrudability	90.2	91.6	92.8
3	Spreadability (g.cm/s)	3.8	4.2	5.8
4	pH	6.9	7.0	7.0
5	Colour	Light green	Green	Olive green
6	Consistency	Semisolid	Semisolid	Semisolid
7	Washability	Excellent	Excellent	Excellent
8	Foam ability	Good	Good	Good
9	Grittiness	No grittiness	No grittiness	No grittiness
10	Irritancy test	No irritation	No irritation	No irritation

CONCLUSION

The idea that natural medicines are safer and have fewer negative effects than synthetic ones makes them more acceptable. The demand for herbal formulations is rising on the global market. The goal of this work was to create a polyherbal face wash gel for treating acne using cucumber extract, curcuma longa extract, neem extract and aloe vera extract. The desired Face Wash gel

formulation was created and its physicochemical characteristics, including colour, scent, pH, spreadability, viscosity, foamability, and microbiological test, were assessed. According to the current experiment, the designed herbal face wash gel is more effective than the commercial face wash gel. All of the formulations' superior inhibitory effectiveness against acne-causing microorganisms was seen in the microbiological assay, and formulation (F3) was competitive with the widely used formulation. It was determined that the current study may, in theory, enhance both the development of herbal formulations for the safe and efficient management of diseases as well as the use of herbs in the treatment of acne. The study also found that the prepared herbal Face Wash Gel has all of the necessary components for topical use.

REFERENCES

1. Arun Rasheed, Avinash Kumar Reddy G, Mohanalakshmi S, Ashok Kumar C.K, Formulation and comparative evaluation of poly herbal Anti-acne face wash gels, Pharmaceutical Biology, 2011; 49: 771–774.
2. Brijyog, Anupmaiti, Laliteshwar Pratap Singh, Formulation and Evaluation of Anti-Microbial Polyherbal Gel, Journal of Research in Pharmaceutical Science, 2017; 3: 11-14.
3. Bhagyasri Y, Pavan kumar Sara, Siva Subramanian N, Formulation and Evaluation of Poly Herbal Facewash Gel for Anti-Microbial Activity, World Journal of Pharmaceutical and Life Sciences, 2017; 7: 104-107.
4. Rajesh H, Rao S.N, Prathima K Shetty, Megha Rani N, Rejeesh E.P, Lovelyn Joseph, Phytochemical analysis of aqueous extract of Ocimum sanctum linn, International Journal of Universal Pharmacy and Bio Sciences, 2013; 2: 463.
5. Lee Weng Foo, Eraricar Salleh, SitiNur Hana Mamat, Extraction and Qualitative Analysis of Piper Betle Leaves for Antimicrobial Activities, International Journal of Engineering Technology Science and Research, 2015; 2: 1-8.
6. Sowmya K.V, Darsika C, Fatima Grace X, Shanmuganathan S, Formulation and evaluation of a polyherbal face wash gel, World Journal of Pharmacy and Pharmaceutical Sciences, 2015; 4: 585-588.
7. Quddus, M. A., The cropland agroforestry experiences of the village and farm forestry project in Northwest Bangladesh. National Workshop, September 16-17, 2001 Gazipur, Bangladesh, 2001; 229-239.
8. Ahmed, S.A. and M. Grainage, Use of indigenous plant resources in rural development, potential of neem tree. Int. J. Dev. Technol., 1985; 3: 123-130.
9. Baby, A. R., Zague, V., Maciel, C.P.M., Kaneko, T. M., Consiglieri, V. O., Velasco and M. V. R. Development of Cosmetics Mask Formulations. Rev Bras Cienc. Farm, 2004; 40(10): 159-161.
10. Mitusi T. New Cosmectic Science; Elsevier Science B.V., the Netherlands; 1st ed; 148-149 Indian standard -6608- 1978; Govt of India, 1997: 4-5.
11. Aburijai, T. and F.M. Natsheh Plants used in cosmetics. Phytother. Res., 2003; 17: 9871000.
12. Akhtar, M.W., M.Z, Iqbal and M.N. Nawazish, Lipid and fatty acid composition of pumpkin seed oil. J. Sci. Res., 1980; 32: 295-300.
13. V. N. Deshmukh, J. K. Jadhav, D. M. Sakarkar. Formulation and in vitro evaluation of theophylline anhydrous bioadhesive tablets, Asian J Pharma, 2009; 54-58.
14. Barry, B. W, Dermatological Formulations, Marcel Dekker. Inc. New York, Basel, 1983; 18: 96- 115.